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### (54) Method for processing poultry.

(57) Meat and poultry portions, such as chicken breasts, are marinated uniformly with standardized quality and various conditions encountered in the manufacturing process, such as meat texture and moisture variations and different temperatures, pressures, etc. in the marinating procedure. This is achieved by mixing a batch of raw products in a marinade to pass the products periodically out of the marinade through reduced from atmospheric pressure air. The meat and the marinade are simply metered to provide a predetermined amount of marinade, such as 10% by weight, to be absorbed by the meat. The meat is then simply mixed or agitated with the marinade until all the marinade is

absorbed. Thus, every batch under every condition will have the same amount of marinade in each part. Similarly, a coating of mixture of dry powders is applied to the moistened surface of the marinated products to produce a uniform thin coating adhering to the surface. Flavourings and spices are in the coating mixture for achieving product taste, and sugar solids to achieve a product appearance. Thus, the coating is baked on as an elastic rubbed adhering coating that remains through cooking, freezing and reheating cycles. The baking cooks the products and colors the coating to the appetizing an pleasant appearance similar to roasted meat, even when reheated in a microwave oven.

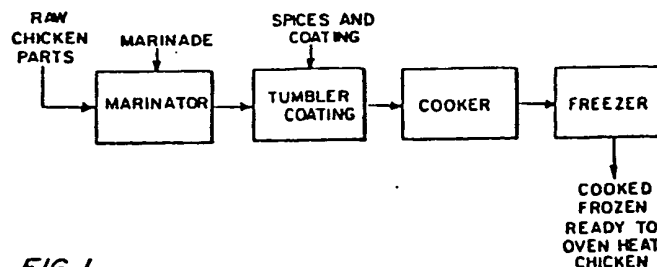


FIG. 1.

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## METHOD FOR PROCESSING POULTRY

### Technical Field

This invention relates to the commercial processing of poultry parts and more particularly it relates to flavoring and coating poultry parts to improve the flavor and appearance of the poultry.

### Background Art

In the commercial food industry providing preprocessed meats and poultry, it has long been the custom to cover the products with a breading. A significant part of the function of the breading is cosmetic, and in general the breading must be fried to produce a pleasing and appetizing golden brown color. It may not be incidental that the cost and weight of the breading is less than that of the meat or poultry. Also, the breading can serve as a carrier of spices or flavorings.

In these circumstances, however, the prior art is deficient in several respects. With accents on light and low calorie foods and dietary restrictions against fats, both the breading and the frying steps are at times unacceptable. Also, the flavored breading is just that and is not product flavoring. Furthermore, it is very difficult to provide breadings that will survive cooking, freezing and reheating cycles normal for frozen pre-cooked foods. Should the breaded foods be cooked or warmed in other ways than frying, they lose their appetizing appearance, particularly if cooked or warmed in microwave ovens, which do not naturally brown the outer surfaces.

Thus, there are not available acceptable methods of coating and flavoring meats for commercial production, and in particular for commercially producing poultry products so that they are natural in appearance and have special spices and flavors permeated into the meat instead of the outer breading crust.

Meats and poultry may be marinated to improve texture and flavor. It has been the practice to marinate meat and poultry products by tumbling in a marinade solution and to apply reduced pressure during the tumbling, as shown for example by U S-A-7,766. Tumblers are currently available from many manufacturers for use in the meat industry. Other examples of marinating equipment for meat and poultry include U S-A-3,928,634, U S-A-4,012,808, and U S-A-4,265,766. The marination of hams and larger meat portions has been enhanced by the injection of marinade before pickling in a marinade solution as set forth in U S-A-4,038,426.

However, there is a deficiency in the prior art relating to the quality control of marinated meat products. Thus, because of varying portions, sizes of products, pressures, tumbler speeds, processing times, etc., it is extremely difficult to get a product consistently marinated the same way with every batch, resulting in different tastes and textures. This is particularly true when each product must be separately injected with marinade, since the percentages of marinade absorbed by the meat cannot be held constant for different size and/or shapes of the meat products.

Commercial methods need be susceptible of mass production simply, fast, at low cost, and with unskilled labor. Also, simplified capital production equipment is a significant requirement, both because of cost and maintenance. Typical tumbling equipment used in methods for flavoring and coating meat products is set forth in U S-A-7,766 showing a simple tumbler and in U S-A-3,595,680 showing a more complex tumbler. The complex equipment may have large down time gaps for servicing either routine cleaning and maintenance or for catastrophic failure. Furthermore, critical timing and operational procedures readily vary product quality, and may require careful and skillful attention by skilled labor.

Accordingly, it is an objective of this invention to improve the state of the art in commercial production of meat and poultry products by resolving the foregoing deficiencies.

A more specific objective of this invention is to provide improved quality control and consistency in the flavor and appearance of poultry products.

Other objects, features and advantages will be found throughout the following description, drawing and claims.

#### Disclosure of the Invention

Thus, in accordance with this invention, there is provided a method of coating meats such as poultry parts with coatings that enhance the flavor and appearance of the parts without requiring frying. In particular, the method provides high quality appetizing frozen, pre-cooked, ready to heat and eat poultry parts. The resulting coating is a thin glaze of a desired color similar to that of roasted poultry, for example, devoid of breading and fats, yet containing and sealing thereunder special spices and flavorings that flavor the poultry itself without confinement in just the breading.

These results are obtained by including sugar solids in a thin coating placed on raw meat portions and baking it in place as a glaze coating in an

oven hot enough to color the coating to a natural roasted appearance. The coating adheres firmly for subsequent freezing and reheating steps.

Equipment for the coating process comprises simply a rotary tumbler, preferably with a vacuum pump, into which the product with a moist adhesive layer is resident for tumbling with a coating mix having dry powdered ingredients including spices that are soluble in the moist adhesive layer. In part flavoring is interspersed throughout the meat portion by marinating in the tumbler before the coating step. The resulting massaging brings out the natural myosin proteins to the surface of the meat, particularly when further tumbled in the presence of sub-atmospheric pressures, thereafter to be sealed in place by glazing the coating in a hot dry heat oven. The coating mixture therefore contributes both a predominant outer coloring and predominant flavoring desirable for any particular product line.

A particularly critical step of this coating process is the provision of a significant percentage of sugar solids in the dry powder mix applied to the raw meat surface, thus producing when baked at high temperature dry heat a natural looking roast meat coloring which is retained during subsequent freezing and reheating cycles.

The method of quality control of meat and poultry parts as provided by this invention provides for tumbling batches of products of substantially similar sizes and shapes, such as chicken breast portions, in the presence of a controlled amount of additives. Thus, for a marination step they are marinated in a measured amount of marinade in a rotating tumbler with an air space at pressure reduced from atmospheric. The tumbler is rotated at such speeds that the meat parts are carried out of the marinade into the reduced pressure air and separated from the other parts so that the entire surface of all products is exposed to the reduced pressure air to condition the products for absorbing the marinade uniformly. Then when dropped back into the marinade they absorb it uniformly. This procedure is repeated for a number of tumbling cycles. Preferably the parts are raw unseasoned meat portions of size to be served in individual meal entrees, so that tumbling can be completed in a few minutes.

The products, thus conditioned to absorb the marinade, will not be subject to spotty or local absorption centers, but will uniformly absorb the marinade over their entire surfaces. However, the amount of marinade absorbed is still variable depending upon many factors such as meat texture and moisture, time of rotation, temperature, pressure, etc., all of which can

change from batch to batch. It is preferable for tenderization to marinate uncooked poultry or meat products. The present invention will assure that batches of similarly sized meat portions marinated will have uniform marination, even should the moisture content, texture or shape of the portions change considerably from batch to batch.

This is achieved simply and reliably by metering out predetermined amounts of marinade into the tumbler for the batch of meat products, such as 10 % by weight, and tumbling under the above described conditions until substantially all the marinade is absorbed into the products.

In accordance with this invention a variety of differently flavored product lines may be produced by simply varying the coating mix spices and flavorings. Ethnic flavorings such as hot Mexican, Oriental Teri-Yaki, Indonesian Curry, etc. are exemplary.

This process is particularly suitable for preparation of portion sized frozen pre-cooked meat entrees, ready to heat and eat. Thus, poultry parts of uniform size and shape, such as breasts or wing joints, may be very quickly and economically processed in simple equipment with consistent results that will assure the same taste, appearance and quality from batch to batch, even when many manufacturing variables are encountered such as variations in temperature, moisture, size, shape, fat and presence of skin, etc.

#### **Brief Description of the Drawings**

In the drawings Fig. 1 is a block diagram of the poultry processing system afforded by this invention and Fig. 2 is a diagrammatic end section view of a rotating tumbler drum for marinating and coating meat products in accordance with the teachings of this invention.

#### **The Preferred Embodiment**

As may be seen from the drawing, Fig. 2 shows the simple rotating drum tumbler used in the marinating and coating steps shown in Fig. 1. Thus, in the marinating step the tumbler drum 15 of about one meter diameter rotates as indicated by arrow 16 at about two revolutions per minute with a marinade 18 therein and a batch of meat products, such as chicken portions 19. The drum is partly filled to leave an air space 17 thereabove, which is evacuated to a pressure below atmospheric when the drum is rotated to marinate a batch of meat products, which are typically meal sized portions.

The internal drum pressure is important, since the meat portions to be marinated come from the atmosphere and thus contain air in the capillaries and tissues which can block the quick entry of the marinade. Thus, typically a

pressure below atmospheric such as 0.6 to 0.8 Bar is maintained in the tumbler when the marinating is taking place, thereby to remove the air from the meat products, letting it be replaced quickly by absorbed marinade. Thus, as seen from the drawing, the poultry pieces 19 are rotated out of residence in the marinade and are allowed to fall through the reduced pressure air portion so that their whole surface is exposed before being reintroduced into the marinade. This takes place over several cycles. The drum rotation therefore is such that the parts 19 are not held by centrifugal force against the outer wall, but will be pulled off by gravity as they near the top of their travel path. Otherwise, closely packed parts 19 are not held by centrifugal force against the outer wall, but will be pulled off by gravity as they near the top of their travel path. Otherwise, closely packed parts 19 would tend to have only the outermost exposed local regions exposed to the reduced pressure atmosphere and thus would not tend to be uniformly penetrated by the marinade.

As hereinbefore explained, it is desirable to have every part and every batch uniform for quality control purposes. To overcome all the possible variations encountered such as moisture content of the meat, pressure from batch to batch, different meat textures, etc., it has been found by this invention that the uniformity is very simply controlled by metering out the amount of meat in each batch and the marinade, to control the amount of materials in the tumbler. Then the materials are tumbled until the entire amount of marinade is absorbed by the meat. Thus, whatever the variables, the amount of absorbed marinade per kg of meat remains constant.

In a typical example, 45.5 kg. of raw chicken breasts or wing joints and 4.5 kg of marinade were rotated at two revolutions per minute in a one meter diameter drum for between six and twenty-five minutes until all the marinade was absorbed. The chicken parts then weighed 50 kg., and the meat moisture content was substantially uniform throughout. The barometric pressure was 0.7 Bar during the rotation.

The marinade solution may vary, of course, to give appropriate flavor or tenderness, etc.

For the coating step of Fig. 1, the same simple drum may be used after the marinade is all absorbed, by adding the spices and coating mixture. The massaging action of the marinating process effected in this matter, as taught by the above mentioned U S-A-4,038,426, results in the coating of the meat with a congealed layer of viscous protein. This constitutes a preferred

adhesive coating on the poultry parts being processed by this invention. Thus, when a dry powdered mixture of spices, flavoring and coating ingredients is added and the chicken parts tumbled for a few minutes, a uniformly disposed coating layer adheres to the outer surface of the product. In order to cause some penetration, as in the marinating step, of the spices and flavoring into the body of the chicken parts, preferably the tumbler is evacuated to a pressure slightly less than atmospheric, such as 0.8 Bar.

The coating mix contains dextrose and sugar solids to constitute the primary coating constituents, the remainder being flavoring and spices. This is devoid of any fats and starches for dietary purposes. Even more significant, these ingredients with the protein produce a glaze coating when cooked in the next step shown in Fig. 1. This glaze coating elastically covers the surface and seals in the spices and flavoring and firmly adheres during subsequent freezing and reheating cycles. It is preferably heated by baking for about ten to twenty minutes in a dry oven at high temperature, such as 250°C, while the raw chicken is cooked. With this sugar solid content, the glaze coating is very thin and is thus browned until it establishes the predominant color of the chicken to be similar to roast chicken, providing a highly attractive and appetizing appearance. Thus, preferably the sugar solid content of the coating mix is in the order of 25% by weight, with the remainder, dextrose, flavoring and preserving ingredients.

Several kinds of product lines of different featured flavors can readily be established in this manner. Thus consider the following examples:

For an Oriental Teri-Yaki line, soy sauce powder, onion and garlic powder may constitute typical ingredients.

For a hot Mexican flavoring, hot pepper powders and paprika may be used.

For Indonesian flavoring, curry powder may constitute the main flavoring ingredient.

Citric acid, lime or lemon flavoring may be used. Not all ingredients need be powdered, but since the myosin protein adhesive coatings are water soluble, it is preferable to use dry powder mix ingredients to prevent dilution or loss of the adhesive and key coating constituent.

Cheeses may be used for Italian flavoring ingredients.

Other lines may use sour cream powder, tomato powder, celery salt or proprietary spice mixtures.

Since the weight of the chicken parts (50 kg.) following the marination step is known, it is again a simple step to assure uniformity of flavoring by simply metering out a predetermined amount of a premixed additive powder mix. No variations of the product or processing (temperature, time, pressure, etc.) cause differences in flavor quality. Other moist adhesive coatings could be applied without the marinating step, if desired, as a base for the coating mixture.

This coating afforded by the invention, therefore has not only distinctive advantages of quality control and cosmetic beauty, but also is securely adhered in place to ruggedly withstand freezing, storage in frozen state and reheating. In particular, the products may be reheated to serving temperature in microwave ovens, and still have the appearance of roasted chicken. The appearance is particularly good for chicken products, and those having skin thereon, but also provides for other meats a natural and appetizing browned appearance with microwave warm up.

It is to be recognized that various flavorings and glazing mixtures may be employed. Similarly the product is preferably pre-marinated, particularly in the case of tough meats or dry chicken breasts, and various marinades may be used for tenderizing and flavoring. It is essential for quality control however, that the amounts of marinade and flavorings be precisely controlled for any product line or flavor, so that the internal meat is uniformly marinated.

The amount of marinade is precisely controlled by metering out the exact quantity desired, such as 10% by weight, into a rotating tumbler, and tumbling until the liquid marinade is completely absorbed into the products, leaving the surface sticky with the myosin proteins generated by the tumbling. Then a new tumbling cycle is started with a precisely measured quantity of additive spices and flavorings in the binding protein-sugar solid glazing layer base material, so that the additives may be uniformly rubbed over the entire product surface and be impregnated into the surface layer of the product. This raw glazing layer is then cooked with the product in a dry oven atmosphere, to bake in place, where it becomes more impermeable, thereby to seal in the marinade liquid so that it is more difficult to dehydrate in the freezing process and the storage in the frozen state.

The following examples provide preferred preparation steps for the products, in exemplary flavors, for explicit product lines. Variations including the addition of flavorings such as soy sauce in paste or liquid form rather



than in powder form to the glazing mixture are of course possible. It is essential however to substantially eliminate the starches, flours and oils from the glazing layer, a step which departs in spirit and principal from the prior art attempting to provide acceptable appearance by a breaded surface coating of a meat product.

#### EXAMPLE 1

To provide an oriental or teriyaki flavored chicken portion, the primary ingredients for the glazing mixture in dry powder form are dextrose, corn syrup solids, soy sauce powder, spices and the natural myosin proteins above described.

#### EXAMPLE 2

Curry powder may be substituted in the mixture of Example 1 for the soy sauce powder. Other such substitute flavors and spices may be used as desired, including cheeses, peppers, garlic or onion salts, etc.

#### EXAMPLE 3

As above, wherein the products are impregnated by 10% by weight of a liquid marinade solution, by metering product and marinade weight into a rotating tumbler and tumbling until all the marinade is absorbed into the products.

#### EXAMPLE 4

As above described, with the meat product cooked in a baking oven at a temperature of about 250°C for from eight to twenty minutes, or until the glazing coating attains the desired final coloring.

#### EXAMPLE 5

Same as Example 4 wherein the products are chicken parts and the final coloring simulates the golden brown of roasted chicken.

#### EXAMPLE 6

Same as Example 4, wherein the products are frozen and stored in frozen state until ready to serve, and are then warmed to serving temperature in a micro-wave oven. They resemble roasted chicken in color, appearance and taste.

#### EXAMPLE 7

Same as Example 6, except warming in deep fat. The product has similar color, appearance and taste, but has a thin oil layer which adds calories.

It is therefore evident that this invention provides a novel and superior product line affording dietary characteristics, high quality control of

flavoring and preparation, a variety of product characteristics for differing product themes and lines, excellent appearance and flavor, and better preservation in the frozen state.

It is further clear therefore that this invention provides a readily reproducible product quality that may be maintained under all kinds of unusual processing conditions without experienced or skilled labor and with simple processing equipment comprising a mixer such as a rotating tumbler. Therefore the state of the art is advanced. Accordingly, those novel features believed descriptive of the nature and spirit of this invention are defined with particularity in the following claims.

**CLAIMS**

1. The method of processing poultry or meat parts of controlled sizes and shapes to provide uniform characteristics of a processed meat product that may be pre-cooked, frozen and thereafter reheated for quick serving, characterized by the steps of:

placing a batch of raw meat products of known weight in a rotatable tumbler,

partially filling the tumbler with a predetermined amount of liquid marinade equal to a desirable percentage of the weight of the marinade to be contained in the finished products, to leave an air space above the marinade,

rotating the tumbler at speeds permitting the products to alternately reside in the liquid marinade and be carried by the tumbling action into the air space until substantially all of the marinade is absorbed by the products, thereby establishing a fixed percentage of marinade to product weight in the presence of an extensive range of variation of product and process parameters.

2. The method of claim 1, characterized by the step of reducing the pressure of the air in said air space to below atmospheric.

3. The method of claim 2, characterized by the step of proportioning the marinade to product ratio to produce marinade substantially equally distributed through the products.

4. The method of claim 1, characterized by the steps of tumbling the products after the marinade is absorbed in the product until the surface develops a moist adhesive layer of myosin protein, and adding thereto a coating mix comprising dry powdered materials soluble in said adhesive layer including spices and glazing substances.

5. The method of claim 4, characterized by the steps of restricting the glazing substances to exclude fats, starches and flours, including in the glazing substances sugar solids and proteins that will produce when heated an outer sealing layer which adheres to the products when thereafter frozen and reheated, to thus seal the marinade into the products.

6. The method of claim 5, characterized by the steps of providing the glazing substances with sugar solids that impart a desired surface appearance similar to that of a roast product when the product is pre-cooked in dry heat.

7. The method of claim 6, characterized by the step of cooking the coated product in dry heat at about 250°C from six to twenty-five minutes.
  8. The method of claim 7, characterized by the step of freezing the product for storage with the glazing coating serving as a sealing layer retaining the marinade in the frozen state.
  9. The method of claim 8, characterized by the step of preparing the frozen parts to serve by warming in a microwave oven while the glaze remains intact to prevent loss of the marinade and the product attains a serving color imparted by the characteristics of the glaze coating as achieved during the pre-cooking step.
  10. The method of claim 4, characterized by the step of including sugar solids as a primary coloring agent for the product.
  11. The method of claim 4, characterized by the step of keeping the coating mixture substantially devoid of oils, starches, flours and fats, thereby to produce the sole outer dietetic product coating adhering to the meat surface.
  12. The method of processing poultry or meat parts of controlled sizes and shapes to provide uniform characteristics of a processed meat product that may be pre-cooked, frozen and thereafter reheated for quick serving, characterized by the steps of:
    - tumbling raw meat portions in a marinade solution until the marinade is substantially absorbed by the meat and the surface develops a moist adhesive layer of myosin protein,
    - adding a coating mix in the form of a plurality of dry powdered materials soluble in said adhesive layer, and continuing the tumbling to produce a smooth continuous outer coating layer directly on the meat portions.
  13. The method defined in claim 12, characterized in that the dry coating mix constitutes proteins and sugar solids and is substantially devoid of fats, starches or flours.
  14. The method defined in claim 13, characterized in that the meat portions and the layer are cooked in dry heat at about 25°C from six to twenty-five minutes.
  15. The method defined in claim 14, characterized in that the sugar solids are selected to impart the primary coloring ingredient to the glaze coating in response to the cooking step.
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FIG. 1.

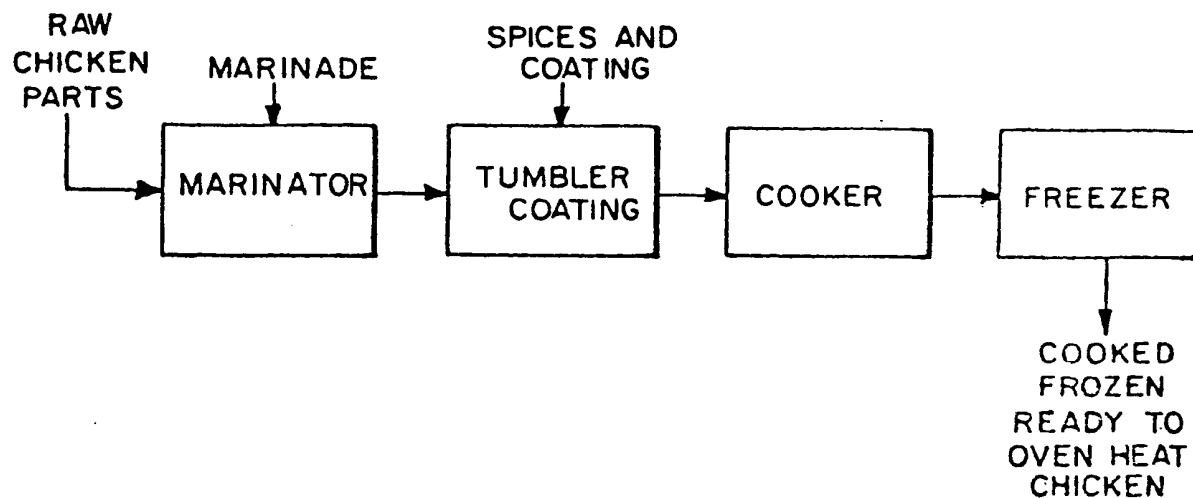
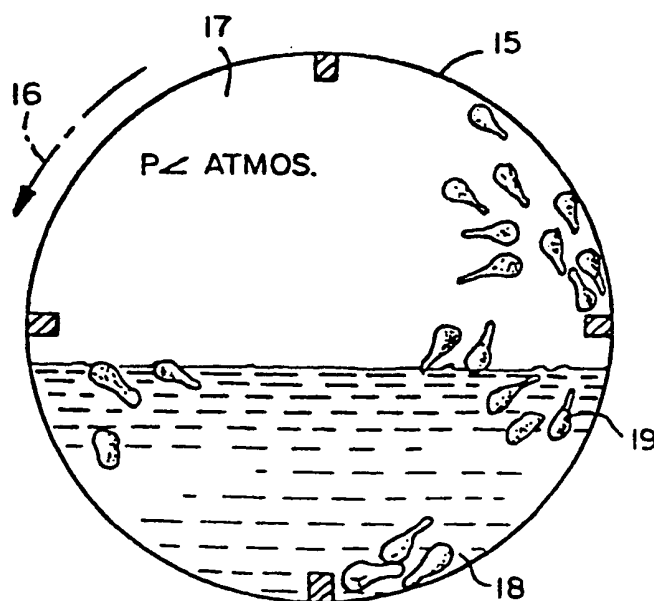


FIG. 2.





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(54) **Method for processing poultry.**

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Similarly, a coating mixture of dry powders is applied to the moistened surface of the marinated products to produce a uniform thin coating adhering to the surface. Flavorings and spices are in the coating mixture for achieving product taste, and sugar solids to achieve a product appearance. Thus, the coating is baked on as an elastic rubbed adhering coating that remains through cooking, freezing and reheating cycles.

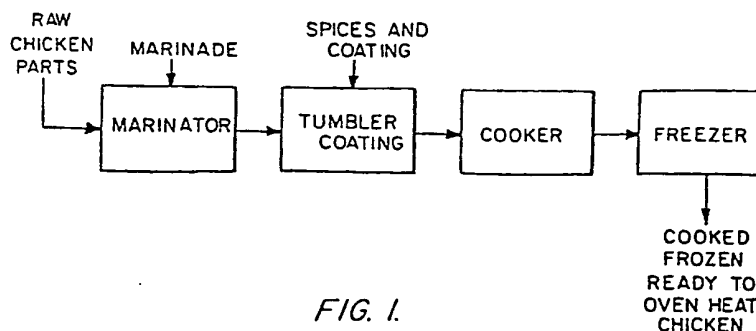


FIG. 1.

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# EUROPEAN SEARCH REPORT

0181024

Application Number

EP 85 20 1719

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Y	US-A-3 928 634 (G. GASBARRO) * Claims 1-5; column 3, line 49 - column 4, line 48; column 5, line 64 - column 6, line 29; examples * ---	1-3	A 23 L 1/318 A 23 L 1/315
Y	GB-A-2 059 247 (R. MILLER) * Claim 1; column 2, lines 21-39 * ---	1-3	
A	JOURNAL OF FOOD SCIENCE, vol. 47, 1982, pages 1016-1017, 1019; T.C. CHEN: "Studies on the marinating of chicken parts for deep-fat frying" * Page 1016, columns 1, 2 * ---	1, 4	
A	CA-A- 884 212 (R. ANGOLD) * Claim 1; page 6, lines 48-50 * ---	1, 4	
A	DE-A-2 818 862 (COMET-INOX) * Claim 1 * ---	1, 2	
A	PATENT ABSTRACTS OF JAPAN, vol. 7, no. 242 (C-192)[1387], 27th October 1983; & JP-A-58 129 942 (NITSUTOU SEIFUN K.K.) 03-08-1983 * Abstract * ---	5	TECHNICAL FIELDS SEARCHED (Int. Cl.4)  A 23 L A 23 P
A	US-A-4 458 586 (BUCKLEY REED) -----		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 19-05-1988	Examiner DESMEDT G.R.A.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	

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